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IT PAYS TO BE NICE: THE BENEFITS OF COOPERATING IN MARKETS

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It Pays to be Nice:
The Benefits of Cooperating in Markets[1]

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Abstract

This paper contributes to the experimental literature by examining the causal effect of partner-choice opportunities on the earnings of different cooperative types. We first elicit cooperative types and then randomly assign subjects to a repeated prisoner's dilemma game with either mutual partner choice or random matching. In each round, the individual who fails to attain a partner is excluded from the group. This design allows us to study the causal effect of partner choice on earnings and exclusion. The results from two experiments show that partner choice allows cooperators to outperform free riders, cooperators earn more than free riders, and cooperators are less frequently excluded.

Keywords: cooperation; commitment; partner choice; punishment
JEL Codes: D02, C91, C92

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1. Introduction

Do nice guys finish last? As most market exchanges are open to opportunistic behavior, free riders can benefit over cooperative individuals by exploiting opportunity for short-term gains.[5] However, markets typically involve the opportunity for partner choice. When partnerships are formed through mutual consent, people tend to prefer those who keep their end of the bargain as trading partners. Those who do not are left without a partner and may need to redeem themselves by being more cooperative in future partnerships. Hence, in the market process of exchanging goods and services, partners also exchange approval and disapproval of each other's behavior, creating an unintended "marketplace of morality" in which cooperative individuals are rewarded (Otteson, 2002, p. 101).

In this paper, we experimentally explore whether cooperative individuals are rewarded in markets. We do this by allowing subjects to choose their partners in a repeated prisoner's dilemma game.[6] We conduct two experiments to examine whether partner choice increases the earnings of cooperators and reduces the earnings of free riders. To measure these effects exogenously, both experiments consist of a two-step design. In step 1, we classify subjects as either cooperators or free riders using the strategy method in a one-shot, sequential continuous prisoner's dilemma game (Fischbacher, Gächter, & Fehr, 2001; Kurzban & Houser, 2005; Selten, 1967). In step 2, resembling repeated interactions in markets, subjects are randomly assigned to a fixed group where there is either an opportunity for partner choice or random matching in each round. To separate subjects' initial cooperative strategies from how they

[5] For instance, in labor markets, both the employee and employer may deviate from expected behavior. Even in an apparently clear-cut situation, such as ordering a pizza delivery, there is room for opportunistic behavior. The deliverer may bring a lower quality pizza than the buyer expects, or the buyer may demand a reimbursement by claiming that the pizza quality is worse than it is.

[6] Many scholars emphasize that markets may be interpreted as a prisoner's dilemma, with possibilities for partner choice (Boyd, Bowles, & Gintis, 2010; Orbell & Dawes, 1993; Sen, 1985b; Tullock, 1985; Vanberg & Congleton, 1992).

perform during the repeated game, we classify them into a type category before they are randomized into either the partner choice or the random matching treatment. We do not inform the subjects about the classified types from step 1. Thus, we limit the reputation effect to private experience.

In both the partner choice and random matching treatment, the subjects play a 20-round, repeated simultaneous prisoner's dilemma game with another subject from their group. At the end of each round, the subjects receive private information about their own contribution and earnings and their partners' identity tags. Subjects interact within a fixed group consisting of an odd number of subjects. In every round, one subject is excluded, and only pairs of two subjects can continue to a production stage. In the Choice treatment, one subject who fails to attain a partner is excluded. In the Random treatment, one subject is randomly excluded. To avoid design-driven results, the excluded person in both treatments receives 0 Experimental Currency Units (ECU).

Experiment 1 and Experiment 2 differ in two respects. In the first experiment, the groups consist of five subjects, and the subjects are informed about their entire private history—their own contributions and earnings and the partners' identity tags. In the follow-up experiment, the groups consist of nine subjects, and we limit the displayed private information to current-round contributions, earnings, and partners' identity tags.[7] Increasing the group size and limiting the private information to only the current period shapes the design toward a more standard random matching procedure: the probability of meeting the same partner in the Random treatment of Experiment 2 is lowered compared to Experiment 1.[8] Moreover, in larger groups, it is more difficult for the subjects to keep track of the ID tags of their previous partners.

[7] See Duffy and Xie (2016), Nosenzo, D., Quercia, S., and Sefton, M. (2015) and Miller (1956) for a discussion about group size and cooperation.

[8] For a fixed group of five subjects, the expected probability of having the same partner from the previous round is 1/5 = 0.20. Over 20 rounds of play, the expected number of partnerships between the same two subjects is 4.

Both experiments show that cooperative individuals earn more and are less likely to be excluded in the Choice treatment than in the Random treatment. Moreover, we show that partner choice may function—indirectly—as a means of punishing free riders. Free riders earn less and are more frequently excluded in the Choice than in the Random treatment. We also show that partner choice increases overall earnings. The overall effect of partner choice on earnings is larger in Experiment 2, suggesting that partner choice may be a more beneficial sorting mechanism in an environment that resembles a more standard random matching procedure.

Our paper contributes to the experimental literature on partner choice with a focus on measuring the causal effect of partner-choice opportunities on the earnings of different cooperative types. In the literature on partner choice, choosing a partner is seen as a regrouping device that helps cooperative individuals avoid exploitation (Barclay & Raihani, 2016; Dreber, 2008). Subjects choosing cooperative strategies do well when they can withdraw from partners who are unlikely to cooperate (Rockenbach & Milinski, 2006; Aktipis, 2011) and when they can express a preference about whom they want as their partner (Page, Putterman, & Unel, 2005; Barclay & Willer, 2007).[9] As a complement to this literature, we design a two-step experiment that allows us to exogenously measure the effect of mutual partner choice on the earnings and the probability of exclusion of different cooperative types.

Closest to our theoretical motivation are two recent papers on Adam Smith's propositions of other-regarding behavior, Smith (2018) and Smith and Wilson (2018). By

For a fixed group of nine subjects, the expected probability of having the same partner from the previous round is 1/9 = 0.11. During 20 rounds of play, the expected number of partnerships between the same two subjects is 2.22, suggesting a more difficult matching environment in Experiment 2.

[9] For a theoretical discussion about types and assortative matching, see also Alger and Weibull (2013); Bergstrom (2003); Frank (1987); and Izquierdo, Izquierdo, and Vega-Redondo (2014). The "indirect evolutionary approach" in game theory shows that changes in interaction patterns favor some preference types over others. Our study may be viewed as an empirical counterpart to this theoretical approach; randomly assigning preference types to different rules of the game allows us to study how the latter exogenously shifts the "balance of power" among types, throwing light on the origins of other-regarding motivations. See Bester and Güth (1998); Güth and Yaari (1992); and Güth (1995) for discussion about the "indirect evolutionary approach."

"other regarding," we mean that "the individual's specific actions are sensitive to their consequent beneficial or hurtful effect on others" (Smith, 2018, p. 9). The process of exchanging approval and disapproval of one another's behavior is essential for the adoption of other-regarding behavior. To facilitate the process of approval and disapproval in our experiment, we create an environment in which the supply of potential partners is lower than the demand. In this way, we link approval of someone's behavior to being chosen as a partner, and disapproval is linked to exclusion.[10,11]

The remainder of the paper is organized as follows: section two presents Adam Smith's propositions of other-regarding conduct. Section three describes the experimental design of the first and follow-up experiments. Section four reports the results, while section five concludes.

2. Propositions of Other-Regarding Conduct

The idea that markets foster cooperative conduct can be traced back to Adam Smith's Theory of Moral Sentiments (1759).[12] Smith articulated two propositions to explain how other-regarding conduct arises and how it is sustained. First, restricting the temptation to act self-interestedly is derived from humans being sociable, not from other-regarding utility (Smith & Wilson, 2018). It is in and through society that humans learn other-regarding behavior; everyone matures in a society and learns through experience to "humble down the arrogance of self-love, and bring it down to something which other men will go along with" (Smith, 1759, p. 83). Paradoxically, the common knowledge that all people are self-interested assists in the

[10]For a discussion about costly punishment, see Guala (2012); Gürerk, Irlenbusch, and Nikiforakis (2008); Cinyabuguma et al. (2006); Cinyabuguma et al. (2005); and Walker (2004). For a review on the social effects of exclusion, see Leibbrandt et al. (2015); Feinberg, Willer, and Schultz (2014); Nosenzo and Sefton (2014); Rigaud Maier, Martinsson, and Staffiero (2015), and Masclet et al. (2003).

[11]See also Brekke, Hauge, Lind, and Nyborg (2011); Coricelli, Fehr, and Fellner (2004); Huck, Lünser, and Tyran (2012); Hauk and Nagel (2001); Page, Putterman, and Unel (2005); Strømland, Tjøtta, and Torsvik (2018); and Barclay and Raihani (2016) for empirical evidence of the effect of endogenous partner choice.

[12]See also Greif (1993); Hayek (1973); Henrich et al. (2001); Sen (1985a); and Smith (2016).

process of evolving rules of conduct (Smith & Wilson 2018). People learn to be other-regarding through socialization in which beneficent actions are approved of and hurtful actions are disapproved of (Smith, 2018). Receiving approval from others when a rule of conduct is followed encourages repetition in the future. Receiving disapproval from others encourages people to adapt to behaviors others will go along with. The proposition assuming that everyone is self-interested is essential for judging which actions deserve approval and which deserve disapproval.

The second proposition states that the motivation to behave in ways that others approve of is based on the desire for praise and praise-worthiness and the desire to avoid blame and blame-worthiness (Smith, 2018). Praise and blame are means of describing why people sometimes act in defiance of other's judgements. Praise-worthiness and blame-worthiness are means of describing the willingness to follow a certain rule of conduct even in the absence of praise and blame. Without distinguishing the two principles from one another, people would know which actions others would go along with, but they would have no *desire* to pursue these actions.

> The love of praise-worthiness is by no means derived altogether from the love of praise. These two principles, though they resemble one another, though they are connected, and often blended with one another, are yet, in many respects, distinct and independent of one another. (Smith, 1759, III.2.2, p. 114)

Smith's vision of human sociability is one of constant adjustment. Learning how actions hurt or benefit others as well as oneself provides the foundation of how people become accustomed to following rules that are other-regarding. During the process of voluntarily exchanging judgements of appropriate and inappropriate behavior, people gradually adjust their behavior to follow rules that are met with approval. In our experimental design, we elicit subjects' cooperative strategies in step 1 to be able to explore the extent to which they alter

their cooperative strategies when given the opportunity to choose a partner. This means that subjects who we initially elicit to be free riders may become more cooperative as a way of regaining approval from other group members.

The Smithian rules of conduct are related to the issue of how to maintain commitment to an optimal action given the temptations of acting self-interestedly (Khalil, 2017; Smith & Wilson, 2018, p. 18). In game theory, the idea that a personal commitment to cooperative strategies may benefit individuals is often traced back to Schelling (1960). Frank (1987) developed this idea further by arguing that, in a setting where cooperators are distinguishable from others, a commitment to cooperation leads to access to reliable partners. Subjects who have a genuine commitment toward cooperation will be in high demand, as they are unlikely to cheat their partner.

3. Experimental Design

Our experimental design consists of two steps, as illustrated in Figure 1:

Step 1: We obtain measures of cooperative types using the strategy method (Selten, 1967) in a one-shot, continuous prisoner's dilemma game.

Step 2*:* The participants are randomly assigned to a finitely repeated prisoner's dilemma game, which features two possible matching procedures: either partner choice or random matching in each round.

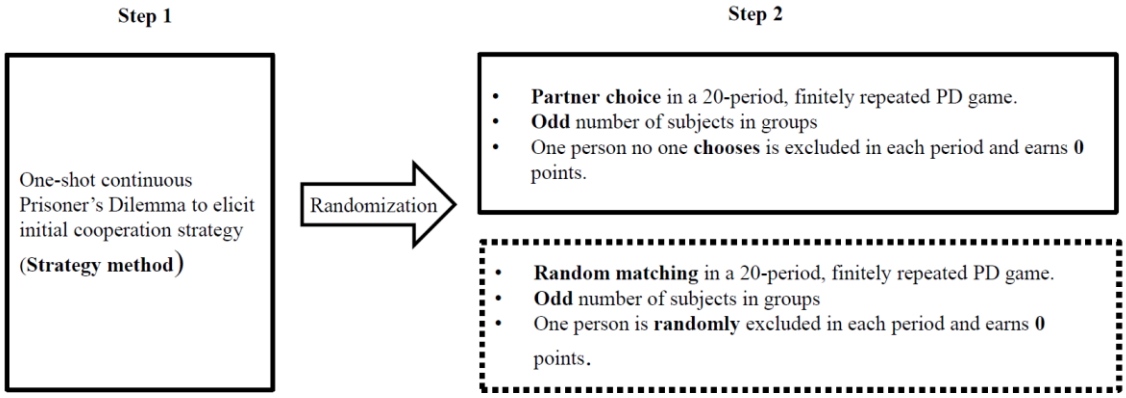

Figure 1: A two-step experimental design

Prior to steps 1 and 2, the subjects are informed about the payoff function and answer a set of control questions to ensure their understanding of the task (Fischbacher et al., 2001; Fischbacher & Gächter, 2010). Before proceeding, the subjects need to answer the control questions correctly. If they answer incorrectly, they are provided with the correct answers on the computer screen. The subjects are first informed about step 1, after which they make choices in relation to this step. We inform them that there will be a step 2, but we do not provide further details. In step 2, we do not inform the participants about the input or output of the strategy method. Thus, this design reduces strategic spill-over between the two steps and allows for an exogenous treatment effect for the different types. In both steps, we use the following earnings function:

$$\pi_i = 10 - x_i + 0{,}7(x_i + x_j), \qquad [1]$$

where x_i and x_j denote the subjects' own and their partner's contribution choices. If both parties contribute their entire endowments of 10 units, both earn 14. If both contribute zero, they earn 10.[13]

[13] A translated copy of the instructions is provided in Appendix D.

3.1 Step 1: Elicitation and classification of initial cooperative strategies

In both experiments, we use step 1 of the experiment to obtain measures of cooperative types that are independent of the choice and Random treatment. For the type elicitation procedure, we employ the strategy method (Fischbacher, Gächter, & Quercia, 2012; Selten, 1967) and follow the seminal design of Fischbacher et al. (2001). The type elicitation procedure consists of, first, an *unconditional contribution* choice and, thereafter, *conditional contribution* choices. The subjects are informed that one of these two decisions will be randomly drawn to determine their actual payoff and that their partner will be randomly drawn.

In the conditional contribution choice, the subjects fill out a conditional contribution table for each possible contribution choice made by their partner. To classify participant *i* as type θ_i, we use the information provided by the 11 conditional contribution entries (denoted by y_i^k, k= 0,1,2…10.). We define two types: **cooperators** (unconditional cooperators who contribute most of the time, and reciprocators who tend to match their partner's choices) and **free riders**, who rarely contribute. Residual subjects are labeled as **others**. Our classification procedure is inspired by Kurzban and Houser (2005), who estimated subjects' linear contribution profiles (LCPs) before classifying them into types.[14] The subjects' Ordinary Least Square estimated contribution profile is given by: $y_i^k = \alpha_i + \beta_i y^k + u_i^k$ (k = 0, 1, 2, ...10), where u_i^k is the error term. The constant term captures a participant's unconditional willingness to cooperate, and the slope measures the response to the partner's contribution.

We base the classification of cooperative types on a 25% bandwidth. The 25% bandwidth means that those whose LCPs lie everywhere below 25% of the endowment are free riders, all those whose LCPs everywhere above 75% of the endowment are unconditional cooperators, and those whose LCPs are no further away from the 45-degree line than 25% of

[14] Similar classification methods are used by, e.g., Fichbacher and Gächter (2010), Burlando and Guala (2005), and Fischbacher et al. (2001).

the endowment are reciprocators. Thus, unconditional cooperators have LCPs that are always above 75% of the endowment. Formally, a participant is an unconditional cooperator if and only if his or her predicted contributions $\hat{y}_i^k \geq 7.5$ for all k. We classify reciprocators as those participants having LCPs within a band of 25% of the endowment along the 45-degree line. Formally, participant *i* is classified as a reciprocator if and only if his or her predicted contributions $-2.5 + k \leq \hat{y}_i^k \leq 2.5 + k$ for all k. Free riders have a predicted conditional contribution that is strictly below 25% of the total endowment. Graphically, this means that the LCP always lies below 25% of the endowment of 10. In our case, the predicted contributions are $\hat{y}_i^k < 2.5$ for all k. The remaining participants are classified as others.[15]

We use different bandwidths to make sure that the chosen bandwidth of 25% does not drive our results. All findings are shown to be robust to different bandwidth choices of 0% and 50%. A bandwidth of zero corresponds to a free rider who contributes zero in all entries, a reciprocator who perfectly matches his/her partner's choices, and a cooperator who always contributes his/her entire endowment. Table C3 in the Appendix displays the distribution of elicited types using different bandwidths.

Table 1 displays the distribution of elicited types from step 1 between the Choice and Random treatments in both Experiment 1 and Experiment 2.[16]

[15] Within the "others" category, there is a group of subjects whose intersection is above 75% with a downward sloping graph: $7.5 - k \leq \hat{y}_i^k \leq 12.5 - k$ for all k.

[16] The estimated linear contribution profiles allow for predicted contributions outside the feasible interval [0,10]. However, only 6% of the predicted contributions in Experiment 1 and 6.47% in Experiment 2 lie outside this range.

Table 1: Distribution of Types between Treatments (%) by Experiment

Experiment 1: Type	**Choice**	**Random**
Cooperator	66%	53%
-Unconditional Cooperator	11%	12%
-Reciprocator	55%	41%
Free rider	6%	10%
Other	28%	37%
Total	**100**	**100**

Experiment 2: Type	**Choice**	**Random**
Cooperator	67.36	63.19
-Unconditional Cooperator	9.72%	7.64%
-Reciprocator	57.64%	55.56%
Free rider	4.86%	11.81%
Other	27.78%	25.00%
Total	**144**	**144**

3.2 Step 2: Repeated prisoner's dilemma game

Experiment 1: *Groups of five subjects and full private history*

In step 2, the participants in a session are randomly assigned to one of two experimental treatments, the **Choice** or the **Random** treatment. We use within-session randomization whereby the participants are randomly assigned a treatment by drawing notes lettered A–J from an urn. When the experiment is over, the participants fill out a questionnaire with their assigned letter so that the earnings may be linked to their experimental identity tag.

Table 2 provides the details concerning the number of participants, groups, and sessions in Experiment 1.

Table 2: Main Features of Experiment 1

Treatments	**Experiment 1**
Choice	20 groups, 100 subjects
Random	20 groups, 100 subjects
Fixed group size	5 members per group
Private information	Current and previous rounds

In both treatments, each participant in Experiment 1 is placed in a fixed group of five subjects and informed that the group will remain fixed throughout the experiment. We use odd

numbers of subjects in the fixed groups so that in each round, an individual who has not attained a partner is excluded from the group in that round.

In the **Random** treatment, the participants are informed that the group will be fixed throughout the experiment. They receive a numbered identity tag and are informed that this and other subjects' identity tags will be fixed. In each round of the game, individuals receive an endowment of 10 units, and they decide how much to contribute according to payoff function [1]. The default contribution is set to zero. The participants are informed that the person with whom they will produce in each round is determined by random assignment. As there is always one extra participant in the group, one participant will always be randomly excluded from the production stage in that particular round. In case of exclusion, the payoff is zero in that round. Before each production stage, participants who are not excluded are informed of their partners' identity tags. After each production stage, a screen shows the participant's earnings and his\her partner's identity tag. In Experiment 1, the screen shows all *preceding* earnings and partners' identity tags. In the instructions, we refer to the other players as a "person," not a "partner."

The **Choice** treatment is identical to the Random treatment except for the procedures for partner assignment. Instead of a random assignment, prior to each production stage, the participants choose their preferred partner in the fixed group of subjects for that round. For the 10-second duration of the partner-choice stage, participants can freely enter a number on the computer screen. The default is set to their own identity tag. Two participants match if there is mutual consent (both participants choose each other). The subject who fails to find a partner is excluded after reading the following message: "You will not participate in this production period. In this period, you earn 0 points." Subjects who have managed to match mutually with a partner read: "You are person X. The person you chose also chose you. You are producing with person Y in this period."

However, if more than one subject fails to find a partner, one is drawn to be excluded while the others are randomly assigned an available partner. Those who did not match mutually with a partner read either: "You are person X. The person you chose did not choose you. You will not participate in this production period. In this period, you earn 0 points" or "You are person X. The person you chose did not choose you. You are randomly paired with person Y, with whom you can produce in this period."

Experiment 1 was conducted in November 2015. The experiment was programmed with z-Tree (Fischbacher, 2007). The participants were undergraduate students enrolled at the University of Bergen, and we recruited by e-mail.[17] Each participant earned 100 NOK for showing up. On average, the experiment lasted 30 minutes, and the participants earned 202 NOK (25.30 USD). This corresponds with an hourly pay of 404 NOK (48.6 USD) and is well above the average hourly pay for an undergraduate student in Norway. After the experiment was completed and while the assistant prepared the earnings in a separate room, the participants were offered an opportunity to sign up to receive an email about the research project after it has been finalized.

Experiment 2: *Groups of nine subjects and limited private information*

Experiment 2 is identical to Experiment 1 in all but two features: (i) the number of subjects in the fixed group is increased from five to nine, and (ii) the private information in Experiment 2 is weaker than in Experiment 1: In Experiment 1, each subject's screen displays the history of his or her contributions and payoff and their previous partners' identity tags. In Experiment 2, each subject's screen shows only his or her current contribution, payoff, and partner's identity tag. Increasing the group size from five to nine makes it more demanding for

[17] We used the recruitment platform Expmotor, which was provided by Erik Ø. Sørensen from The Norwegian School of Economics.

subjects to keep track of potential partners and to choose their level of contribution. The weakening of private information makes it even more difficult to keep track of partners. In the small group, we expected subjects in the Random treatment to receive the same partner every fifth round, and every ninth round in the larger groups of the follow-up experiment, making the matching environment of the follow-up experiment more challenging. Table 3 provides the details concerning the number of participants, groups, and sessions in the follow-up experiment.

Table 3: Main Features of Experiment 2

Treatments	**Experiment 2**
Choice	16 groups, 144 subjects
Random	16 groups, 144 subjects
Fixed group size	9 members per group
Private information	Only current round

Experiment 2 was conducted in March 2017, and the participants were undergraduate students enrolled at the University of Bergen. We recruited the subjects through the Hamburg Organizational Online Tool (HROOT) (Bock, Baetge, & Nicklisch, 2012) provided by DIGSSCORE, the University of Bergen. Each participant earned 100 NOK for showing up. On average, the experiment lasted 30–45 minutes, and the participants earned 192 NOK (25 USD). This equals an hourly pay of 290 NOK (38 USD), which is well above the average hourly pay of an undergraduate student in Norway.

4. Results

Result 1: *Partner choice increases overall earnings.*

Table 4 shows that in Experiment 1, across all rounds, earnings are 6.17 percentage points ($p=0.151$) higher in the Choice treatment than in the Random treatment.[18] In Experiment 2, the treatment effect is 19.00 percentage points ($p<0.01$). As shown in Figure 2, the effect on

[18] For ease of presentation, we normalize earnings so that 0 is the minimum average earnings, while 100 is the maximum average earnings. Note that on the individual level, average earnings can be below 0 and above 100.

earnings increases significantly over the course of 20 rounds. Similarly, the estimated effect is positive for most of the rounds in Experiment 1—although not statistically significant.[19] Further examination of the strength of partner choice in these two separate environments shows that partner choice has a significantly larger effect on overall earnings in Experiment 2 than Experiment 1 ($p<0.05$, see Appendix C, Table C1). However, we cannot ascertain which of the changes made to the design of the follow-up experiment drives this difference—the increased group size, the limited private information, or the new sample of participants in Experiment 2.

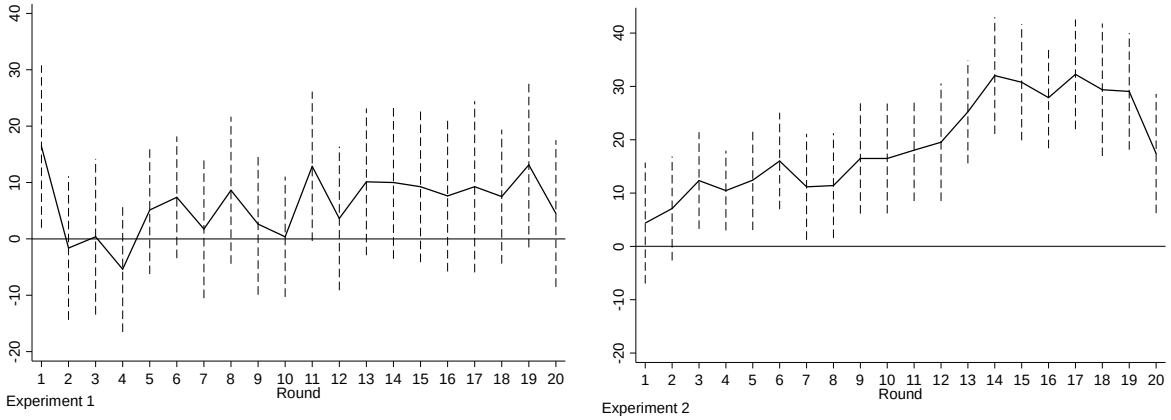

Figure 2: Treatment effect on Earnings by Round and Experiment

Notes: The estimated treatment effects are based on an ordinary least square regression with no controls. Standard errors are clustered on the group level with 95% Confidence Intervals.

Result 2*: Partner choice rewards subjects classified as cooperators and punishes subjects classified as free riders.*

Table 4 shows that the subjects who are classified as cooperators increase their earnings by 20.60 percentage points ($p<0.05$) in Experiment 1 and by 29.06 percentage points ($p<0.01$) in Experiment 2. When partnerships are formed by mutual consent, free riders are punished by

[19] The effect increases by 1.27 percentage points ($p<0.01$) per round in Experiment 2 and by 0.34 percentage points ($p=0.332$) in Experiment 1. See Appendix C Table C2 for regression estimates.

a reduction in earnings of 71.95 percentage points (p<0.05) in Experiment 1 and of 14.39 percentage points (p=0.319) in Experiment 2.

Partner choice affects the earnings of cooperators differently than it does those of free riders. The difference in treatment effect between cooperators and free riders is 92.56 percentage points (p<0.01) in Experiment 1 and 43.45 percentage points (p<0.01) in Experiment 2. The balance of power between the most cooperative and the least cooperative is reversed when there is a competition for partners. Tables A3_1 and B3_1 in Appendices A and B provide the estimated effects for the different bandwidths used to classify the cooperative types.

Table 4: Earning Levels and Treatment Effects by Type and Experiment

Panel 1: Experiment 1	**Random**	**Choice**	**Treatment effect**	**p-value**
Overall	56.45	62.62	6.17	0.151
Cooperators	50.36	70.96	20.60**	0.012
-Unconditional cooperators	37.92	106.86	68.94***	0.008
-Reciprocators	54.00	63.79	9.78	0.387
Free riders	95.00	23.05	-71.95**	0.011
Others	54.74	51.43	-3.31	0.818

Panel 2: Experiment 2	**Random**	**Choice**	**Treatment effect**	**p-value**
Overall	53.27	72.27	19.00***	0.000
Cooperators	46.47	75.53	29.06***	0.000
-Unconditional cooperators	48.45	53.76	5.30	0.837
-Reciprocators	46.20	79.20	33.00***	0.000
Free riders	88.77	74.38	-14.39	0.319
Others	53.70	63.98	10.28	0.332

Notes: *** p < 0.01 ** p < 0.05 * p < 0.10. Estimates are based on an ordinary least square regression with no controls. Standard errors are clustered at the group level. Earnings are normalized such that 0 is the minimum average and 100 is the maximum average earnings.

Result 3*: Partner choice decreases the estimated probability of exclusion for cooperators and increases the estimated probability of exclusion for free riders.*

Table 5 shows that, in Experiments 1 and 2, respectively, free riders have a 12 percentage point (p<0.01) and 5 percentage point (p<0.10) higher estimated probability of exclusion in the Choice treatment (See Tables A4_2 and B4_2 in the Appendices for detailed estimation results). Conversely, being reliable and keeping one's end of a bargain in a

partnership is less likely to lead to exclusion. In both experiments, cooperators are generally less likely to be excluded in the Choice treatment than in the Random treatment. More specifically, the treatment effect is strongest for unconditional cooperators in Experiment 1, with a reduction in the probability of exclusion of 14 percentage points ($p<0.01$), and for reciprocators in Experiment 2, with a reduced probability of exclusion by 3 percentage points ($p<0.05$). We also observe differences in treatment effect between types: free riders in the Choice treatment are more likely to be excluded than cooperators ($p<0.01$) in both Experiment 1 and Experiment 2 ($p<0.05$). Thus, a low contributor is more likely to be excluded, as he or she may be perceived as an unattractive partner. [20]

Table 5: Estimated Probability of Exclusion by Types and Experiment

Panel 1: Experiment 1	**Random**	**Choice**	**Treatment effect**	**p-value**
Cooperators	0.20	0.18	-0.02	0.128
-Unconditional cooperators	0.24	0.10	-0.14**	0.028
-Reciprocators	0.19	0.19	0.00	0.831
Free riders	0.14	0.27	0.12***	0.005
Others	0.21	0.23	0.02	0.475
Panel 2: Experiment 2	**Random**	**Choice**	**Treatment effect**	**p-value**
Cooperators	0.12	0.10	-0.02*	0.086
-Unconditional cooperators	0.10	0.16	- 0.05	0.307
-Reciprocators	0.12	0.09	-0.03**	0.032
Free riders	0.08	0.13	0.05*	0.057
Others	0.11	0.14	0.03	0.280

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Estimates are based on an ordinary least square regression with no controls. Standard errors are clustered at the group level.

Result 4: *Cooperators match mutually with their preferred partner more frequently than do free riders in the Choice treatment.*

Recall that subjects in the Choice treatment can stay in the group through either mutual matching with their preferred partner or being randomly matched with an available subject

[20] In the literature, there is usually no sharp distinction between cooperators and reciprocators (Fischbacher et al., 2001). When discussing our main results, we do not distinguish between unconditional cooperators and reciprocators. However, we do provide separate estimated effects of partner choice on earnings, exclusion, and contribution for unconditional cooperators and reciprocators. We find that the effect of partner choice is strongest for unconditional cooperators in Experiment 1, whereas it is strongest for reciprocators in Experiment 2. See Tables A3_2 and B3_2 in the Appendices for estimated treatment effects on earnings and exclusion for unconditional cooperators and reciprocators separately.

within their group (if more than one person gets rejected by their preferred partner). Thus, subjects in the Choice treatment can only partially affect who they end up with as partners. Tables A6 and B6 in the Appendices show that cooperative subjects mutually match with their preferred partner more frequently than free riders in both experiments.

Moreover, we find that subjects who mutually match with their preferred partner earn more than those who are randomly matched with an available group member in the Choice treatment. Cooperators who match mutually with their preferred partner in the Choice treatment earn 24.5 percentage points ($p<0.01$) more in Experiment 1 and 31.17 ($p<0.01$) more in Experiment 2 than cooperators who are randomly matched with someone. See Tables A7, A8 and B7 and B8 in the appendices for regression estimates.

Result 5: *Partner choice is positively associated with increased overall contributions.*

Table 6 shows that the effect of partner choice on overall contributions is 6.18 percentage points ($p=0.151$) higher in Experiment 1 and 19.00 ($p<0.01$) percentage points higher in Experiment 2 (see the non-bounded column in Table 6). However, when estimating the effect of partner choice on contributions there is, by design, a selection bias, as some types are more likely to be excluded. Therefore, we construct a lower and upper bound effect (Horowitz & Manski, 2000a).[21] The lower bound treatment effect is 15.06 percentage points ($p<0.01$) lower in Experiment 1 and 5.77 percentage points ($p<0.10$) higher in Experiment 2. The upper bound effects are positive in both experiments, 24.95 percentage points ($p<0.01$) and 28.00 percentage points ($p<0.01$) in Experiments 1 and 2, respectively. Panel 3 of Table 6 shows that the effect on contributions increases significantly over the 20 rounds in Experiment 2.

[21] The lower bound depicts a worst-case scenario; in the Random treatment, we assume that the excluded subject contributes 10 units if they were included in the stage game. In the Choice treatment we assume that the excluded subject contributes 0 units. The upper bound assumes that the excluded subject contributes 0 units in the Random treatment, while in the Choice treatment, the upper bound assumes that the excluded subjects contribute 10 units.

Table 6: Effects on Contributions (percentage points) by Experiment

Panel 1: Experiment 1	**Lower**	**Non-Bounded**	**Upper**
Random	65.16	56.45	45.16
Choice	50.10	62.62	70.10
Treatment effect	-15.06***	6.18	24.95***
p-value	0.000	0.151	0.000
Panel 2: Experiment 2	**Lower**	**Non-Bounded**	**Upper**
Random	58.46	53.27	47.35
Choice	64.23	72.26	75.35
Treatment effect	5.77*	19.00***	28.00***
p-value	0.073	0.000	0.000
Panel 3: Over rounds	**Lower**	**Non-Bounded**	**Upper**
Experiment1: Round ×choice	0.269	0.336	0.269
Experiment2: Round× choice	1.13***	1.27***	1.13***

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Estimates are based on an ordinary least square regression with no controls. Standard errors are clustered at the group level. Detailed regression estimates are provided in Tables A1 and B1 in the Appendices.

Result 6: *Partner choice is positively associated with increased contributions for cooperators and free riders in Experiment 2.*

Figure 3 illustrates that partner choice is positively associated with increased contributions in the repeated game for all types in the follow-up experiment, where the groups are larger, and the private information is more limited than in Experiment 1. Moreover, most experiments on partner choice assign subjects into partnerships randomly. Our results suggest that cooperative individuals may be the ones bearing the burden of an observed increase in cooperation when matching is random. We have shown that cooperative individuals, on average, earn less than free riders in the Random treatment despite contributing the more than them. This is notable because cooperators in both experiments maintain high levels of contributions when matching is random.

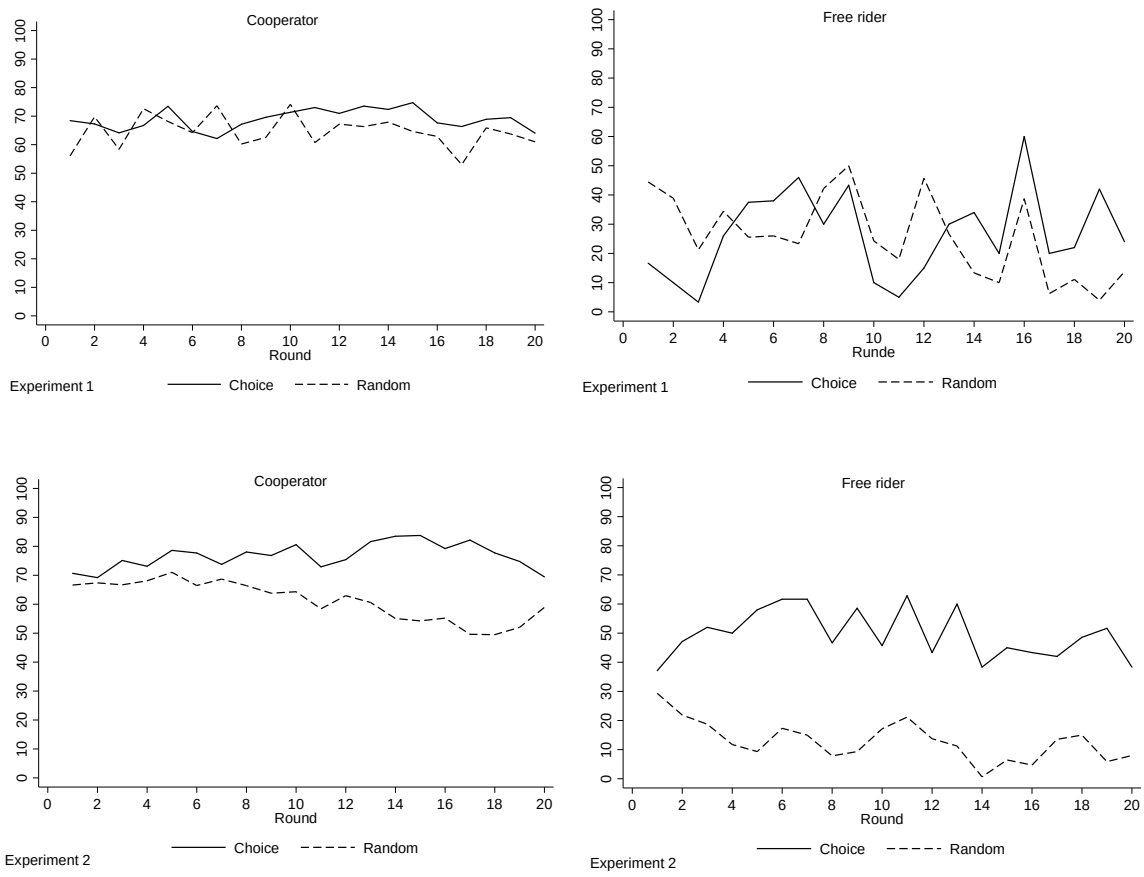

Figure 3: Contribution Profiles over Rounds by Type and Experiment

Notes: Regression estimates in Tables A2 and B2 show that cooperators and free riders do not significantly increase their contributions in Experiment 1, whereas they do increase their contributions in Experiment 2. Estimates are based on an ordinary least square regression with no controls. Standard errors are clustered at the group level.

5. Concluding Remarks

We started by asking if nice guys finish last. Our two experiments show that partner choice rewards cooperators and reciprocators but punishes free riders. Cooperators and reciprocators earn considerably more than free riders and are less frequently excluded. Compared to Experiment 1, the effect of partner choice is stronger in the more challenging environment of Experiment 2 (group sizes of nine subjects and less available private information).

This paper contributes to the experimental literature on partner choice by studying the causal effect of mutual partner choice on the earnings and exclusion of cooperators and free riders. In two experiments, we first elicit cooperative types, and then we randomly assign

subjects to a repeated prisoner's dilemma game involving either partner choice or random matching. When choice of partners is allowed, subjects classified as cooperators are desired as partners, whereas free riders are avoided. When matching is random, we find that the balance of power between cooperators and free riders is reversed: cooperators earn the least while free riders benefit. Despite this, subjects classified as cooperators maintain high levels of contributions, suggesting that they care about more than only maximizing their material earnings.

Adam Smith's theory of other-regarding behavior accommodates the frequently observed tendency for people to cooperate in situations where it does not materially pay. The theory leads to the prediction that people who are cooperative and who are motivated by praise-worthiness will cooperate, even in situations where no one can reward their proper behavior. In line with this prediction, we find that cooperative individuals in the Random treatment continue to cooperate. In the Choice treatment, this other-regarding behavior is favored by the market process—nice guys finish first.

6. References

Alger, I., & Weibull, W. J. (2013). Homo moralis-preference evolution under incomplete information and assortative matching. *Econometrica, 81*(6), 2269–2302.

Akerlof, G. A. (1983). Loyalty filters. *The American Economic Review, 73*(1), 54–63.

Aktipis, C.A. (2011). Is cooperation viable in mobile organisms? Simple Walk Away rule favors the evolution of cooperation in groups. *Evolution and Human Behavior*, 32, 263–276.

Barclay, P., & Raihani, N. (2016). Partner choice versus punishment in human Prisoner`s Dilemmas. *Evolution and Human Behavior*, *37*, 263–271.

Barclay, P., & Willer, R. (2007). Partner choice creates competitive altruism in humans. *Proceedings of the Royal Society of London Series B*, 274, 749–753

Bayer, R. (2015). Cooperation in partnerships: The role of breakups and reputation. *Journal of Institutional and Theoretical Economics*.174(4), 615-638

Bergstrom, T. C. (2003). The algebra of assortative encounters and the evolution of cooperation. *International Game Theory Review, 5*(03), 211–228.

Bester, H., & Güth, W. (1998). Is altruism evolutionarily stable? *Journal of Economic Behavior & Organization, 34*(2), 193–209.

Bock, O., Baetge, I., & Nicklisch, A. (2014). hroot: Hamburg Registration and Organizational Online Tool. *European Economic Review, 71*, 117–120.

Burlando, R., & Guala, F. (2005). Heterogeneous agents in public goods experiments. *Experimental Economics, 8*, 35–54.

Brekke, K. A., Hauge, K. E., Lind, J. T., & Nyborg, K. (2011). Playing with the good guys: A public good game with endogenous group formation. *Journal of Public Economics, 95*(9), 1111–1118.

Cinyabuguma, M., Page, T., & Putterman, L. (2005). Cooperation under the threat of expulsion in a public goods experiment. *Journal of Public Economics, 89*(8), 1421–1435.

Cinyabuguma, M., Page, T., & Putterman, L. (2006). On perverse and second-order punishment in public goods experiments with decentralized sanctioning. *Experimental Economics, 9*(3), 265–279.

Coricelli, G., Fehr, D., & Fellner, G. (2004). Partner selection in public goods experiments. *Journal of Conflict Resolution, 48*(3), 356–378.

Dreber, A., Rand, G. D., Fudenberg, D., & Nowak, A. M. (2008). Winners don't punish. *Nature, 452*, 348–351.

Duffy, J., & Xie, H. (2016). Group size and cooperation among strangers. *Journal of Economic Behavior & Organization, 126*, 55.

Fehr, E., & Gächter, S. (2000). Cooperation and punishment in public goods experiments. *American Economic Review, 90*(4), 980–994.

Feinberg, M., Willer, R., & Schultz, M. (2014). Gossip and ostracism promote cooperation in groups. *Psychological Science, 25*, 1–9.

Fischbacher, U. (2007). z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics, 10*(2), 171–178.

Fischbacher, U., & Gächter, S. (2010). Social preferences, beliefs, and the dynamics of free riding in public goods experiments. *American Economic Review, 100*(1), 541–556.

Fischbacher, U., Gächter, S., & Fehr, E. (2001). Are people conditionally cooperative? Evidence from a public goods experiment. *Economic Letters, 71*(3), 397–404.

Fischbacher, U., Gächter, S., & Quercia, S. (2012). The behavioral validity of the strategy method in public good experiments. *Journal of Economic Psychology, 33*(4), 897–913.

Frank, R. (1987). If homo economicus could choose his own utility function, would he want one with a conscience? *American Economic Review, 77*(4), 593–604.

Greif, A. (1993). Contract enforceability and economic institutions in early trade: The Maghribi traders' coalition. *The American Economic Review, 83*(3) 525–548.

Guala, F. (2012). Reciprocity: Weak or strong? What punishment experiments do (and do not) demonstrate. *Behavioral Brain Science, 35*(1), 1–15.

Gürerk, Ö., Irlenbusch, B., & Rockenbach, B. (2006). The competitive advantage of sanctioning institutions. *Science, 312*(5770), 108–111.

Güth, W. (1995). An evolutionary approach to explaining cooperative behavior by reciprocal incentives. *International Journal of Game Theory*, *24*(4), 323–344.

Güth, W., & Yaari, M. (1992). An evolutionary approach to explain reciprocal behavior in a simple strategic game. In U. Witt (Ed.), *Explaining process and change–Approaches to evolutionary economics* (pp. 23–34). Ann Arbor: University of Michigan Press.

Hauk, E., & Nagel, R. (2001). Choice of partners in multiple two-person prisoner's dilemma games: An experimental study. *Journal of Conflict Resolution, 45*(6), 770–793.

Hayek, F. A. (1973). *Law, legislation and liberty, vol 1: Rules and order.* Chicago: University of Chicago Press.

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., & McElreath, R. (2001). In search of homo economicus: Behavioral experiments in 15 small-scale societies. *The American Economic Review, 91*(2), 73–78.

Horowitz, J. L., & Manski, C. F. (1998). Censoring of outcomes and regressors due to survey nonresponse: Identification and estimation using weights and imputations. *Journal of Econometrics*, *84*, 37–58.

Huck, S., Lünser, G. K., & Tyran, J. R. (2012). Competition fosters trust. *Games and Economic Behavior, 76*(1), 195–209.

Izquierdo, L. R., Izquierdo, S. S., & Vega-Redondo, F. (2014). Leave and let leave: A sufficient condition to explain the evolutionary emergence of cooperation. *Journal of Economic Dynamics and Control, 46,* 91–113.

Kirchler, M., Huber, J., Stefan, M., & Sutter, M. (2015). Market design and moral behavior. IZA Discussion Paper No. 897.

Kurzban, R., & Houser, D. (2005). Experiments investigating cooperative types in humans: A complement to evolutionary theory and simulations. *Proceedings of the National Academy of Sciences of the United States of America*, *102*(5), 1803–1807.

Leibbrandt, A., Ramalingam, A., Sääksvuori, L., & Walker, J. (2015). Incomplete punishment networks in public goods games: experimental evidence. *Experimental Economics*, *18*, 15–37

Liebrand, W. B. G. (1984). The effect of social motives, communication and group size on behavior in an N-person multi-stage mixed-motive game. *European Journal of Social Psychology*, *14*, 239–264.

Masclet, D., Noussair, C., Villeval, M., & Tucker, S. (2003). Monetary and nonmonetary punishment in the voluntary contributions mechanism. *American Economic Review, 93*(1), 366–380.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63,* 81–97.

Nikiforakis, N. (2008). Punishment and counter-punishment in public goods experiments: Can we really govern ourselves? *Journal of Public Economics, 92*(2008), 91–112.

Nosenzo, D., Quercia, S., & Sefton, M. (2015). Cooperation in small groups: The effect of group size. *Experimental Economics*, *18*(1), 4–14.

Nosenzo, D., & Sefton, M., (2014). Promoting cooperation: The distribution of reward and punishment power. In P. A. M. Van Lange, B. Rockenbach, & T. Yamagashi (Eds.),

Social dilemmas: New perspectives on reward and punishment. Oxford: Oxford University Press. 87-114

Orbell, J., & Dawes, R. (1993). Social welfare, cooperators' advantage and the option of not playing the game. *American Sociological Review, 58*, 787–800.

Otteson, R. J. (2002). *Adam Smith's marketplace of life*. Cambridge. Cambridge University Press.

Page, T., Putterman, L., & Unel, B. (2005). Voluntary association in public goods experiments: Reciprocity, mimicry and efficiency. *The Economic Journal, 115*(506), 1032–1053.

Rigaud Maier, F. P., Martinsson, P., & Staffiero, G. (2010). Ostracism and the provision of a public good: Experimental evidence. *Journal of Economic Behavior and Organization, 73*, 387–395.

Rockenbach, B., & Milinski, M. (2006). The efficient interaction of indirect reciprocity and costly punishment. *Nature, 444*(7120), 718–723.

Schelling, T. C. (1960/1980). *The strategy of conflict*. Cambridge, MA: Harvard University Press.

Selten, R. (1967). Die Strategiemethode zur Efrorschung des eingeschränkt rationalen Verhaltens im Rahmen eines Oligopolexperiments. *Beiträge zur experimentellen Wirtschaftsforschung*, 136–168.

Sen, A. K. (1985a). Rationality and uncertainty. *Theory and Decision, 18*(2), 109–127.

Sen, A. K. (1985b). Goals, commitment, and identity. *Journal of Law, Economics and Organization, 1*(2), 341–357.

Smith, A. (1759). *The theory of moral sentiments*. Indianapolis: Liberty Fund. Glasgow edition 1976.

Smith, V. L. (2018). Adam Smith, scientist and evolutionist: modelling other-regarding behavior without social preferences, *Journal of Bioeconomics*, 20, 7-21

Stringham, E. P. (2015). *Private governance*. Oxford: Oxford University Press.

Strømland, E., Tjøtta, S., & Torsvik, G. (2018). Mutual choice of partner and communication in a repeated prisoner's dilemma. *Journal of Behavioral and Experimental Economics, 75*, 12–23.

Tullock, G. (1985). Adam Smith and the Prisoners' Dilemma, *The Quarterly Journal of Economics*,100, 1073-1081.

Vanberg, V. J., & Congleton, R. D. (1992). Rationality, morality, and exit. *American Political Science Review, 86*(2), 418–431.

Walker, J. M., & Halloran, M. A. (2004). Rewards and sanctions and the provision of public goods in one-shot settings. *Experimental Economics, 7*(3), 235–247.

Zak, P. (2008). *Moral markets: The critical role of values in the economy*. Oxford: Princeton University Press.

Appendix A: Experiment 1

Table A1: Bounded Treatment effect on Contributions, Experiment 1

	(1) Lower	(2) Non-bounded	(3) Upper	(4) Non-bounded
Choice	-15.06***	6.175	24.94***	2.644
	(3.375)	(4.219)	(3.375)	(4.558)
Round				-0.274
				(0.255)
RoundChoice				0.336
				(0.335)
Constant	65.16***	56.45***	45.16***	59.33***
	(2.398)	(2.997)	(2.398)	(3.389)
N	4000	3200	4000	3200
adj. R^2	0.034	0.006	0.093	0.007

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level)

Table A2: Bounded Treatment effect on Contributions by Type, Experiment 1

	(1) Lower	(2) Non-bounded	(3) Upper
Choice	-16.65**	1.269	24.52**
	(6.894)	(9.734)	(9.297)
Uncond.Cooperator	50.35***	56.88***	40.68***
	(6.336)	(8.725)	(8.468)
Reciprocator	31.33***	34.57***	26.92***
	(5.320)	(7.046)	(6.381)
Other	27.36***	28.29***	20.51***
	(6.149)	(8.246)	(7.455)
Uncond.CooperatorChoice	-0.350	-5.853	-6.895
	(12.38)	(13.90)	(13.13)
ReciprocatorChoice	3.056	5.657	0.156
	(7.587)	(10.36)	(9.879)
OtherChoice	-5.256	-0.438	-1.500
	(8.211)	(11.20)	(10.33)
Constant	36.15***	25.32***	21.65***
	(5.602)	(7.547)	(6.826)
N	4000	3200	4000
adj. R^2	0.113	0.114	0.139

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Regression is based on the 25% bandwidth type classification. Reference category: Free rider

Table A3_1: Treatment effects on Earnings by Type (standard) and Bandwidth, Experiment 1

	(1) 0%	(2) 25%	(3) 50%
Choice	-105.3***	-71.95**	-38.99
	(17.58)	(26.82)	(27.51)
Cooperator	-52.94***	-44.63***	-34.69***
	(13.58)	(12.49)	(9.617)
Other	-37.72*	-40.25***	-28.48
	(19.14)	(14.74)	(17.61)
CooperatorChoice	131.1***	92.56***	57.18*
	(16.53)	(29.33)	(29.36)
OtherChoice	109.3***	68.64**	28.87
	(20.81)	(30.10)	(40.98)
Constant	96.02***	95.00***	84.03***
	(17.08)	(12.79)	(9.267)
N	4000	4000	4000
adj. R^2	0.004	0.005	0.003

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Reference category: Free rider. In these regressions we do not distinguish between unconditional cooperators and reciprocators.

Table A3_2: Treatment effects on Earnings by Type (detailed) and Bandwidth, Experiment 1

	(1) 0%	(2) 25%	(3) 50%
Choice	-105.3***	-71.95**	-38.99
	(17.58)	(26.83)	(27.52)
Uncond.Cooperator	-66.33***	-57.08***	-42.39***
	(21.81)	(18.07)	(11.72)
Reciprocator	-46.25***	-40.99***	-32.13***
	(12.28)	(11.99)	(10.38)
Other	-37.72*	-40.25***	-28.48
	(19.14)	(14.74)	(17.62)
Uncond.Cooperator Choice	182.4***	140.9***	93.98**
	(32.83)	(36.96)	(36.10)
ReciprocatorChoice	110.4***	81.74**	47.68
	(18.21)	(30.34)	(30.63)
OtherChoice	109.3***	68.64**	28.87
	(20.82)	(30.11)	(40.99)
Constant	96.02***	95.00***	84.03***
	(17.08)	(12.79)	(9.269)
N	4000	4000	4000
adj. R^2	0.008	0.008	0.006

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level) Reference category: Free rider. In these regressions we distinguish between unconditional cooperators and reciprocators.

Table A4_1: Estimated Treatment effects on the Probability of Exclusion by Type (standard) and Bandwidth, Experiment 1

	(1) 0%	(2) 25%	(3) 50%
Choice	0.217***	0.122***	0.0889**
	(0.0255)	(0.0410)	(0.0371)
Cooperator	0.0852***	0.0559**	0.0477***
	(0.0226)	(0.0266)	(0.0133)
Other	0.0900***	0.0685**	0.0460
	(0.0278)	(0.0307)	(0.0375)
Cooperator Choice	-0.237***	-0.144***	-0.112**
	(0.0328)	(0.0476)	(0.0420)
Other Choice	-0.218***	-0.0995*	-0.0460
	(0.0316)	(0.0505)	(0.0777)
Constant	0.117***	0.145***	0.161***
	(0.0242)	(0.0243)	(0.0130)
N	4000	4000	4000
adj. R^2	0.002	0.003	0.002

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Reference category: Free rider. In these regressions we do not distinguish between unconditional cooperators and reciprocators.

Table A4_2: Estimated Treatment effects on the Probability of Exclusion by Type (detailed) and Bandwidth, Experiment 1

	(1) 0%	(2) 25%	(3) 50%
Uncond.Cooperator	0.117***	0.0967***	0.0712***
	(0.0363)	(0.0338)	(0.0211)
Reciprocator	0.0694***	0.0440	0.0399***
	(0.0216)	(0.0266)	(0.0145)
Other	0.0900***	0.0685**	0.0460
	(0.0279)	(0.0307)	(0.0375)
Choice	0.217***	0.122***	0.0889**
	(0.0255)	(0.0410)	(0.0371)
Uncond.Cooperator Choice	-0.345***	-0.259***	-0.208***
	(0.0720)	(0.0733)	(0.0598)
ReciprocatorChoice	-0.194***	-0.117**	-0.0867*
	(0.0386)	(0.0506)	(0.0445)
OtherChoice	-0.218***	-0.0995*	-0.0460
	(0.0316)	(0.0505)	(0.0777)
Constant	0.117***	0.145***	0.161***
	(0.0242)	(0.0243)	(0.0130)
N	4000	4000	4000
adj. R^2	0.005	0.005	0.005

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Reference category: Free rider. In these regressions we distinguish between unconditional cooperators and reciprocators.

Table A5: Overall Contributions, by Type in Experiment 1 (standard)

	(1) Free rider	(2) Cooperator	(3) Other
Choice	1.269	4.095	0.831
	(9.731)	(5.023)	(5.007)
Free rider	0	-39.37***	-28.29***
	(.)	(6.834)	(8.243)
Cooperator	39.37***	0	11.08**
	(6.834)	(.)	(4.556)
Other	28.29***	-11.08**	0
	(8.243)	(4.556)	(.)
FreeriderChoice	0	-2.826	0.438
	(.)	(10.06)	(11.20)
CooperatorChoice	2.826	0	3.264
	(10.06)	(.)	(6.407)
OtherChoice	-0.438	-3.264	0
	(11.20)	(6.407)	(.)
Constant	25.32***	64.69***	53.61***
	(7.545)	(3.748)	(3.173)
N	3200	3200	3200
adj. R^2	0.095	0.095	0.095

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Reference category column 1: Free rider, column 2: Cooperator, column 3: Other. Regression is based on the 25% bandwidth type classification.

Table A6: Frequency of Mutual and Random Match within the Choice treatment, by Type in Experiment 1

Panel 1: Experiment 1	**Mutual match**	**Random match**
Cooperator	43.86	56.14
-Unconditional cooperator	54.5	45.45
-Reciprocator	41.73	58.27
Free rider	28.33	71.67
Other	38.04	61.96

Table A7: Effect on Earnings of subjects with a mutual match in the Choice treatment, by Type in Experiment 1 (standard)

	Earnings
Choice	24.50***
	(4.525)
Freerider	-10.000
	(11.85)
Other	15.34**
	(7.025)
FreeriderChoice	-12.67
	(19.21)
OtherChoice	-21.90**
	(8.788)
Constant	127.8***
	(3.451)
N	1600
adj. R^2	0.017

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster robust standard errors in parentheses (clustered at the group level) Bootstrapped (400 reps). Observations who have earned 0 because of exclusion are not included in the regression analysis. N is reduced from 3200 because we only consider observations in the Choice treatment. Regression is based on the 25% bandwidth type classification. Reference category: Cooperator.

Table A8: Effect on Earnings of subjects with a mutual match in the Choice treatment, by Type in Experiment 1 (detailed)

	Earnings
Choice	18.76***
	(4.920)
Freerider	-11.67
	(11.86)
Reciprocator	-10.97
	(9.944)
Other	13.67*
	(7.132)
FreeriderChoice	-6.927
	(19.20)
ReciprocatorChoice	30.59***
	(11.69)
OtherChoice	-16.17*
	(8.886)
Constant	129.4***
	(3.797)
N	1600
adj. R^2	0.020

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster robust standard errors in parentheses (clustered at the group level) Bootstrapped (400 reps) Observations who have earned 0 because of exclusion are not included in the regression analysis. N is reduced from 3200 because we only consider observations in the Choice treatment. Regression is based on the 25% bandwidth type classification. Reference category: Unconditional cooperator.

Appendix B: Experiment 2

Table B1: Bounded Treatment effect on Contributions, Experiment 2

	(1) Lower	(2) Non-bounded	(3) Upper	(4) Non-bounded
Choice	5.774*	19.00***	28.00***	5.663
	(3.108)	(3.496)	(3.108)	(4.244)
Round				-0.957***
				(0.225)
RoundChoice				1.270***
				(0.290)
Constant	58.47***	53.27***	47.35***	63.32***
	(2.042)	(2.297)	(2.042)	(2.889)
N	5760	5120	5760	5120
adj. R^2	0.005	0.062	0.123	0.073

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level).

Table B2: Bounded Treatment effect on Contributions by Type, Experiment 2 (detailed)

	(1) Lower	(2) Non-bounded	(3) Upper
Choice	23.83	36.89**	44.33***
	(14.20)	(15.41)	(12.70)
Uncond.Cooperator	55.11***	58.81***	52.30***
	(8.563)	(9.958)	(9.099)
Reciprocator	45.18***	47.03***	40.82***
	(4.663)	(5.910)	(5.679)
Other	38.51***	40.00***	35.19***
	(6.283)	(6.998)	(6.241)
Uncond.CooperatorChoice	-32.36*	-30.13	-26.69
	(18.19)	(19.03)	(15.90)
ReciprocatorChoice	-18.94	-20.33	-18.47
	(13.89)	(15.03)	(12.46)
OtherChoice	-25.73	-24.77	-21.64
	(15.51)	(16.61)	(13.72)
Constant	19.53***	12.87**	11.88**
	(3.849)	(4.915)	(4.655)
N	5760	5120	5760
adj. R^2	0.091	0.165	0.192

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Regression is based on the 25% bandwidth type classification. Reference category: Free rider.

Table B3_1: Treatment effects on Earnings by Type (standard) and Bandwidth, Experiment 2

	(1) 0%	(2) 25%	(3) 50%
Choice	-19.35	-14.39	-27.29
	(31.28)	(14.22)	(18.72)
Cooperator	-43.89***	-42.30***	-37.66***
	(12.71)	(9.341)	(7.971)
Other	-42.93***	-35.07***	-44.62***
	(9.232)	(9.648)	(11.83)
CooperatorChoice	54.06	43.45***	55.79**
	(32.22)	(15.40)	(21.75)
OtherChoice	34.92	24.68	35.28
	(31.20)	(18.18)	(24.90)
Constant	93.02***	88.77***	85.93***
	(9.530)	(8.558)	(7.527)
N	5760	5760	5760
adj. R^2	0.011	0.010	0.012

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p<0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Reference category: Free riders. In these regressions we do not distinguish between unconditional cooperators and reciprocators.

Table B3_2: Treatment effects on Earnings by Type (detailed) and Bandwidth, Experiment 2

	(1) 0%	(2) 25%	(3) 50%
Choice	-19.35	-14.39	-27.29
	(31.29)	(14.22)	(18.72)
Uncond.Cooperator	-44.53*	-40.32**	-37.61**
	(24.82)	(19.38)	(15.12)
Reciprocator	-43.79***	-42.57***	-37.67***
	(11.90)	(8.907)	(7.714)
Other	-42.93***	-35.07***	-44.62***
	(9.233)	(9.650)	(11.84)
Uncond.Cooperator Choice	15.59	19.69	46.86
	(44.32)	(30.09)	(33.67)
ReciprocatorChoice	64.72*	47.40***	57.67***
	(33.05)	(15.65)	(20.81)
OtherChoice	34.92	24.68	35.28
	(31.21)	(18.19)	(24.90)
Constant	93.02***	88.77***	85.93***
	(9.531)	(8.560)	(7.528)
N	5760	5760	5760
adj. R^2	0.015	0.012	0.012

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Reference category: Free riders. In these regressions we do distinguish between unconditional cooperators and reciprocators.

Table B4_1: Estimated Treatment effects on the Probability of Exclusion by Type (standard) and Bandwidth, Experiment 2

	(1) 0%	(2) 25%	(3) 50%
Choice	0.0583	0.0521*	0.0878*
	(0.0647)	(0.0264)	(0.0433)
Cooperator	0.0210	0.0417**	0.0350**
	(0.0183)	(0.0174)	(0.0164)
Other	0.0213	0.0333**	0.0390*
	(0.0135)	(0.0136)	(0.0195)
CooperatorChoice	-0.0848	-0.0707**	-0.108**
	(0.0690)	(0.0307)	(0.0505)
OtherChoice	-0.0475	-0.0256	-0.0347
	(0.0659)	(0.0364)	(0.0597)
Constant	0.0917***	0.0765***	0.0810***
	(0.0130)	(0.0128)	(0.0132)
N	5760	5760	5760
adj. R^2	0.001	0.001	0.004

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Reference category: Free riders. In these regressions we do not distinguish between unconditional cooperators and reciprocators.

Table B4_2: Estimated Treatment effects on the Probability of Exclusion by Type (detailed) and Bandwidth, Experiment 2

	(1) 0%	(2) 25%	(3) 50%
Uncond.Cooperator	0.00833	0.0281	0.0262
	(0.0295)	(0.0222)	(0.0210)
Reciprocator	0.0230	0.0435**	0.0362**
	(0.0186)	(0.0183)	(0.0166)
Other	0.0213	0.0333**	0.0390*
	(0.0135)	(0.0136)	(0.0195)
Choice	0.0583	0.0521*	0.0878*
	(0.0647)	(0.0264)	(0.0433)
Uncond.Cooperator Choice	0.0235	0.000497	-0.0674
	(0.0939)	(0.0581)	(0.0698)
ReciprocatorChoice	-0.113	-0.0823**	-0.115**
	(0.0698)	(0.0322)	(0.0498)
OtherChoice	-0.0475	-0.0256	-0.0347
	(0.0659)	(0.0364)	(0.0597)
Constant	0.0917***	0.0765***	0.0810***
	(0.0130)	(0.0128)	(0.0132)
N	5760	5760	5760
adj. R^2	0.01	0.00	0.01

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the groups). Reference category: Free rider. In these regressions we do distinguish between unconditional cooperators and reciprocators.

Table B5: Overall Contributions, by Type in Experiment 2 (standard)

	(1) Free rider	(2) Cooperator	(3) Other
Choice	36.89**	15.38***	12.12**
	(15.41)	(3.612)	(5.747)
Free rider	0	-48.47***	-40.00***
	(.)	(6.335)	(6.997)
Cooperator	48.47***	0	8.469
	(6.335)	(.)	(5.683)
Other	40.00***	-8.469	0
	(6.997)	(5.683)	(.)
FreeriderChoice	0	21.51	24.77
	(.)	(15.36)	(16.60)
CooperatorChoice	-21.51	0	3.258
	(15.36)	(.)	(6.810)
OtherChoice	-24.77	-3.258	0
	(16.60)	(6.810)	(.)
Constant	12.87**	61.34***	52.87***
	(4.914)	(2.721)	(4.574)
N	5120	5120	5120
adj. R^2	0.162	0.162	0.162

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). Reference category column 1: Free rider, column 2: Cooperator, column 3: Other. Regression is based on the 25% bandwidth type classification. Regression is based on the 25% bandwidth type classification.

Table B6: Frequency of Mutual and Random Match within the Choice treatment, by Type in Experiment 2

Panel 2: Experiment 2	**Mutual match**	**Random match**
Cooperator	52.1	47.89
-Unconditional cooperator	48.2	51.79
-Reciprocator	52.7	47.23
Free rider	33.57	66.43
Other	36.5	63.5

Table B7: Effect on Earnings of subjects with a mutual match in the Choice treatment, by Type in Experiment 2 (standard)

	Earnings
Choice	31.17***
	(3.159)
FreeRider	15.72*
	(8.360)
Other	9.374**
	(4.636)
FreeriderChoice	2.744
	(11.61)
OtherChoice	-5.896
	(5.632)
Constant	93.46***
	(2.770)
N	2560
adj. R^2	0.051

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster robust standard errors in parentheses (clustered at the group level). Bootstrapped (400 reps). Observations who have earned 0 because of exclusion are not included in the regression analysis. N is reduced from 5120 because we only consider observations in the Choice treatment. Regression is based on the 25% bandwidth type classification. Reference category: cooperators.

Table B8: Effect on Earnings of subjects with a mutual match in the Choice treatment, by Type in Experiment 2 (detailed)

	Earnings
Choice	33.67***
	(3.366)
Freerider	17.02**
	(8.352)
Reciprocator	9.523
	(8.512)
Other	10.68**
	(4.684)
FreeriderChoice	0.249
	(11.67)
ReciprocatorChoice	-18.43*
	(9.678)
OtherChoice	-8.392
	(5.646)
Constant	92.15***
	(2.903)
N	2560
adj. R^2	0.052

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster robust standard errors in parentheses (clustered at the group level). Bootstrapped (400 reps). Observations who have earned 0 because of exclusion are not included in the regression analysis. N is reduced from 5120 because we only consider observations in the Choice treatment. Regression is based on the 25% bandwidth type classification. Reference category: Unconditional cooperators.

Appendix C: Supplementary regressions

Table C1: Estimated effect of Partner choice between Experiments

	(1) Contribution	(2) Earning
Choice	6.175	6.175
	(4.195)	(4.195)
Experiment2	-3.177	-3.177
	(3.751)	(3.751)
Experiment2Choice	12.82**	12.82**
	(5.441)	(5.441)
Constant	56.45***	56.45***
	(2.981)	(2.981)
N	8320	9760
adj. R^2	0.042	0.002

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level). We pooled the data from Experiment 1 and Experiment 2. Experiment2 is a dummy variable indicating whether the data is from the follow-up experiment (value 1) or Experiment 1 (value 0).

Table C2: Effect of partner choice on Earnings over Rounds, by Experiment

	(1) Experiment 1	(2) Experiment 2
Choice	2.644	5.663
	(4.557)	(4.244)
Round	-0.274	-0.957***
	(0.255)	(0.225)
ChoiceRound	0.336	1.270***
	(0.335)	(0.290)
Constant	59.33***	63.32***
	(3.389)	(2.889)
N	4000	5760
adj. R^2	-0.000	0.006

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors in parentheses (clustered at the group level).

Table C3: Distribution of Types by Bandwidth and Experiment

Experiment 1		**Bandwidth**	
Types	**0 %**	**25 %**	**50 %**
Cooperator	9.5 %	11.5 %	16.0 %
Reciprocator	22.5 %	48.0 %	57.0 %
Free rider	4.5 %	8.0 %	13.5 %
Other	63.5 %	32.5 %	13.5 %
Total	200	200	200

Experiment 2		**Bandwidth**	
Types	**0 %**	**25 %**	**50 %**
Cooperator	6.6 %	8.7 %	11.8 %
Reciprocator	31.6 %	56.6 %	67.4 %
Free rider	5.2 %	8.3 %	12.8 %
Other	56.6 %	26.4 %	8.0 %
Total	288	288	288

Appendix D: Instructions

This is an experiment on decisions. You are guaranteed **100 kroner** as show up payment. In addition, you will earn **points** which will be converted into kroner. The total payoff in kroner will be paid out to you in a closed envelope at the end of the experiment. This will be done **anonymously**. We now ask you to read the instructions. An experiment consisting of **two parts** will thereafter be conducted.

You and another person can produce red units together. Both of you will receive 10 blue units each which you can use in the production of red units. The number of produced red units depends on the number of blue units you and the other person use in the production.

1 blue unit= 1 point= 30 øre

1 red unit= 1 point= 30 øre

After you receive 10 blue units you have to decide how many of the blue units you wish to use in the production of red units, and how many you wish to keep for yourself.

The person you are producing with will also decide on how many blue units this person wants to use in the production of red units, and how many this person wishes to keep.

Endowment of blue units= 10 blue units – the amount of blue units you use to produce red units

Endowment of red units= 0.7 × (number of blue units you use + the number of blue units the other person use)

Total amount of points = Endowment of blue units + Endowment of red units

Some examples:

1) If you and the other person use 0 blue units each, then both will receive:
   $10 - 0 + 0{,}7\ (\ 0 + 0) = 10$ points
2) If you and the other person use 5 blue units each, then both will receive:
   $10 - 5 + 0{,}7\ (\ 5 + 5) = 12$ points
3) If you and the other person use 10 blue units each, then both will receive:
   $10 - 10 + 0{,}7\ (\ 10 + 10) = 14$ points

We now ask you to answer the following questions. These questions will help you understand how the amount of total points is linked to the endowment of blue and red units.

Question 1:

You and the other person have 10 blue units each. Assume that both of you use 0 of the 10 blue units to produce red units.

1) What is **your** total endowment of blue units?
2) What is **your** total endowment of red units?
3) What is the total endowment of blue units of **the other person**?
4) What is the total endowment of red units of **the other person**?

Question 2: You and the other person have 10 blue units each. Assume that both of you use 10 of the 10 blue units to produce red units.

1) What is **your** total endowment of blue units?
2) What is **your** total endowment of red units?
3) What is the total endowment of blue units of **the other person**?
4) What is the total endowment of red units of **the other person**?

Question 3:

You and the other person have 10 blue units each. How many red units do you have if you use:

1) 0 of the blue units to produce red units, while the other person uses 10 blue units?
2) 10 of the blue units to produce red units, while the other person uses 10 blue units?

Part 1

This is the **first part** of the experiment. This part consists of only **one period**. You are randomly paired with another person who you can produce with. We ask you to make the following decisions:

1) You have to choose how many of your 10 blue units you wish to use to produce red units.
2) You have to choose how many of your 10 blue units you wish to use conditional on the contribution choices of the other person.

A random draw will decide which of the two decision will be relevant for your final payoff. The points from this part of the experiment will be added to your points from the second part of the experiment.

Part 2

This is the **second part** of the experiment. This part consists of **20 periods.** The production is identical in each period. You are **person *i*.** This number belongs to you throughout the entire experiment. You are randomly assigned to a group which consists of you and four **(eight)** other people. The five **(nine)** of you will be in the same group the entire experiment. The other group members have also been given a number ranging from **1** to **5 (1** to **9)**, and this number belongs to them throughout the entire experiment.

The production stage lasts **10 seconds**. By this time you have to choose how many of your 10 blue units you wish to use to produce red units.

This is done by entering your contribution choice in the blue area on the screen. You have to click the **Update** button when you have chosen how many blue units you wish to use to produce red units.

The production stage is automatically closed after **10 seconds,** and the number of blue units you have entered is registered as your final decision.

In the end of each period you will receive information about your total endowment of blue and red units, and also who you have produced with. The other participants in your group will also receive this private information about their endowments and production partner.

Page 11: Random treatment

In each period you will be assigned to a random individual from your group that you can produce with. One person will be randomly drawn and this individual has to forego the production stage. The person that has to pass on the production earns zero points in this period.

Page 11: Choice treatment.

In each period you have to choose which of the four **(eight)** people in the group you wish to produce with. You can only choose one person. The person you choose must also choose you for you to produce together.

If all but one person finds another subject to produce with, then this person has to forego the production stage in this period. However, if more than one person fails to find another person to produce with, then one person will be randomly drawn and this person has to forego the production stage in this period. The person that has to pass the production stage earns zero pints in this period. This also applies if you choose yourself.

Partner decision messages in the Choice treatment:

You are person X. The person you chose, did not choose you.

You are person X. The person you chose, did not choose you. You are randomly paired with person Y that you can produce with in this period.

You are person X. The person you chose, also choose you. You are producing with person Y in this period.

Exclusion message:

You will not participate in this production period. In this period, you earn 0 points.

Partner decision messages in the Random treatment:

You are person X. You have not been paired with anyone to produce with in this period.

You are person X. You are randomly paired with person Y that you can produce with in this period.

Exclusion message:

You will not participate in this production period. In this period, you earn 0 points.

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